

## ABSTRACT

Boron nitride is a material having been mainly used for industrial applications as heat resistant and abrasion-resistant materials. Currently known  $sp^3$ -bonded  
5 BNs are of cubic phase (3C polytypic form) and wurtzite form (2H polytypic form).

The present invention provides a  $sp^3$ -bonded boron nitride, represented by a general formula BN, having a hexagonal 5H or 6H polytypic form and having a property  
10 of emitting light in ultraviolet region.

Its producing method comprises: introducing reaction mixed gas containing boron and nitrogen being diluted with dilution gas into a reaction chamber; and irradiating a surface of a substrate placed in the  
15 chamber, a growing surface on the substrate, and a growing spacing region about the growing surface with ultraviolet light to cause gas phase reaction, thereby generating, depositing, or growing the boron nitride on the substrate.

20 Since the  $sp^3$ -bonded hexagonal BN of 5H or 6H type has sharp emission at ultraviolet wavelength of 225 nm which is in a range capable of being used in atmosphere but almost borders on a region of vacuum ultraviolet, the BN has great potential as materials for practical  
25 application of solid ultraviolet laser. The practical application of solid ultraviolet laser will make immeasurable technical spillover effects on dramatic increase in capacity of rewritable recording media,

chemistry, medicine, electronics industry, and others.